IN THE TITLE:

Please amend the title, as follows:

~~AUTOMATIC SETTINGS FOR QUANTIFICATION~~Methods for Adaptively Varying Gain During Ultrasound Contrast Agent Quantification

IN THE SPECIFICATION:

Please amend paragraphs 23, 37, 40 and 48 of the specification as follows:

[0023] The other detector 20 comprises an amplitude detector operating to determine contrast agent information using a method different from detector 15. For example, receive signals are combined and the result amplitude detected by a B-mode detector or a Doppler detector. The detector 20 detects contrast agent information. For example, any of the detectors and associated transmit and receive sequences disclosed in U.S. Patent Nos. ~~_____ and _____ (U.S. Application Serial Nos. 09/514,803 and 09/650,942)~~6,494,841 and 6,682,482, the disclosures of which are incorporated herein by reference, are used. These detectors detect contrast agent information in response to different interpulse phase and/or amplitude modulation. Such detection methods may provide signals representing primarily contrast agent or contrast agent absent tissue information. In other embodiments, the detector 20 detects both contrast agents and tissue information, such as with single pulse or multi-pulse harmonic B-mode imaging. High power transmissions, low power transmissions or combinations of both may be used to avoid or cause destruction of contrast agent as part of imaging contrast agent. In one embodiment, contrast agent data is detected in response to multiple low power pulses with both interpulse amplitude and phase modulation.

[0035] As shown in FIG. 3, the first processor 24 includes a noise frame processor 30, a soft tissue processor 32, and a gain processor 34. The noise frame processor 30 generates an estimate of electronic or thermal noise as the noise varies over the frame. The soft tissue processor 32 generates a smoothed surface indicative of the intensity of soft tissue within an image frame at various locations in the frame. The gain processor 34 uses outputs from the processors 30 and 32 to adaptively adjust or determine either the average gain, depth gain and/or lateral gain. In one embodiment, one or more of the methods and systems of U.S. Patent Nos. 5,579,768; 6,398,733 or ~~_____ (U.S. Application Serial No. 10/176,274)~~6,679,844, the disclosures of which are incorporated herein by reference, are used to determine one or more gain parameters for the tissue information.

[0040] In act 42, a setting is determined. For example, gain parameters or other settings are automatically determined or are set by the user. For automatic determination, any of the processes disclosed in U.S. Patent Nos. 5,579,768, 6,398,733 or ~~(U.S. Application Serial No. 10/176,274)~~6,679,844 or other now known or later developed processes are used. For example, a base line image, such as an image selected to identify tissue or an image selected to identify contrast agent is generated. A thermal noise image may alternatively or additionally be generated by receiving signals without generating a full strength acoustic signal. For example, the transmit path is configured for imaging without activating the waveform generator. Thermal noise generated by the transmit path electronics may cause some transmission of acoustic energy. The receive electronics in combination with any unintentional transmission of acoustic energy generates a thermal noise image. A gain and associated dynamic range is then automatically set in response to the baseline images. Normalization is provided by selecting settings based on a common configuration or information. For example, acquiring baseline images allows normalization of the settings regardless of the region being imaged. Different regions may be associated with different baseline images. By adaptively determining the setting, the setting is normalized to a given imaging region. Alternatively, a user attempts to adjust a setting to a normalized or common point, such as selecting a gain resulting in tissue values at a desired intensity level within the dynamic range.

[0048] In act [[55]]54, one or more settings of an ultrasound system are normalized. The normalization occurs automatically for each repetition of the quantification or triggering event in a same quantification occurrence. For example, the normalization occurs automatically after destruction of contrast agents. The normalization is adapted to receive information from the region of interest after destruction. By automatically normalizing in response to received information, the setting adapts to the current imaging situation for improving image quality and consistency across multiple quantifications.